

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of)
David Edgar Hauber) Art Unit: 1772
Serial No. 09/332,420) Examiner: A. Chevalier
Filed: June 14, 1999)
FOR: REINFORCED THERMOPLASTIC)
PIPE MANUFACTURE)

DECLARATION UNDER 37 C.F.R. 1.132

Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

Sir:

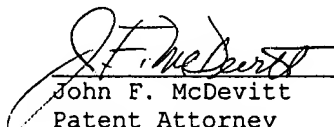
I, Mounir B. Ibrahim, declare as follows:

1. I received a Ph.D. degree in mechanical engineering from Bradford University, Bradford, U.K. in 1977. My employment experience and professional credentials are annexed to this declaration on separate pages together with work projects and publications that I supervised or authored. Listed among these work projects are seven (7) projects dealing with thermoforming of thermoplastic material including a doctoral thesis supervision in the same field. A copy of United States Patent 6,368,102 in this field on which I am a co-inventor is also attached to this declaration.

2. I have reviewed this pending patent application and it is my understanding that the disclosed subject matter relates to reinforcement of one or more hollow thermoplastic pipe members with continuous fiber being thermally bonded to the outer pipe surface. In the described thermal processing procedure, the continuous fiber is applied while the one or more hollow pipe members undergo movement in a linear direction and with the fiber wrapped pipe member or members being thereafter heated sufficiently to cause thermal bonding between fiber and the outer pipe surface. Doing so successfully requires the pipe itself to retain its shape, physical dimensions and structural integrity throughout the entire procedure. It also follows therefrom that only a more limited heating rate during said processing procedure will enhance preservation of these physical characteristics in the final article. As further disclosed in the reviewed application adequate heating from the required thermal bonding can be limited to a melting action taking place at the outer pipe surface. Method claims in the originally filed

as fully dispositive in the present matter. It is respectfully urged, therefore, that all now- amended claims 1, 3, 5, 7 and 9 be allowed as structurally distinguishing over the composite article construction in Gibson et al.

Respectfully submitted


John F. McDevitt
Patent Attorney
Reg. No. 19,141

2255 Par Lane#626
Willoughby Hills, OH 44094
440/585-0919
October 25, 2003

CERTIFICATE OF MAILING

I HEREBY CERTIFY that this RCE application and preliminary amendment for application serial no. 09/332,420 is being deposited with the Postal Service in an envelope addressed to: COMMISSIONER FOR PATENTS, Mail Stop RCE, Box 1450, Alexandria, VA 22313-1450 on this 25th day of October 2003.


John F. McDevitt



Resume: Mounir Ibrahim

Mounir Ibrahim, Professor, Mechanical Engineering Department, Fenn College of Engineering, Cleveland State University, Cleveland, OH 44115,

Tel: (216) 687-2580; Fax: (216) 687-9280, e-mail: m.ibrahim@csuohio.edu

Main Highlights of Scholarly & Professional Achievements

- Over 30 years of Administrative/Academic/Research/Industrial Experiences.
- Chair of ME Department at CSU March 1998-June 2002.
- Professional Engineer of the State of Iowa since 1984.
- Research Proposals and Grants (Over TWO Million Dollars).
- Thesis Supervision (Over 40 Master and Doctoral Students).
- Committees (Member/Chair of Several National/Regional/Local Committees).
- Professional Development (Chaired/Co-Chaired Several International/National Conference-Sessions).
- Membership in Professional Organizations (Fellow ASME, Associate Fellow AIAA, ASCE & SPE, ASME K-14 Committee, Heat Transfer in Gas Turbines).
- Honors and Scholarships (Recipient of Several National/Regional Awards).
- Teaching Responsibilities (Taught Over 20 Undergraduate/Graduate Courses).
- Research Profile and Publications (Over 60 Publications in Prestigious Journals/Conferences Proceedings).
- PATENTS: "High-Temperature, Non-Catalytic, Infrared Heater", U.S. Patent #6368102.

I. ACADEMIC QUALIFICATIONS

1977 Ph.D. in Mechanical Engineering, Bradford University, Bradford, United Kingdom.

III. EMPLOYMENT

1/85 - present Cleveland State University, Cleveland, Ohio; Associate Professor, Professor.

3/98 - 6/02 Cleveland State University, Cleveland, Ohio; Chair, M.E. Department.

8/84 - 9/85 Michigan Technological University, Houghton, Michigan; Assistant Professor.

8/83 - 8/84 Iowa State University, Ames, Iowa; Visiting Assistant Professor.

10/78 - 8/83 University of Petroleum & Minerals, Dhahran, Saudi Arabia; Assistant Professor.

1/74 - 10/78 Bradford University, Bradford, U. K.; Postgraduate Student, Post Doctoral Res. Asst.

IV. RESEARCH PROPOSALS AND GRANTS (Selected grants)

1. "Oscillating Flow and Heat Transfer in a Channel with Sudden Cross Section Change", NASA Lewis for \$152,872 from January, 1989 through December, 1992.

2. "Development of Multi-Dimensional Stirling Engine Design Code", NASA Lewis for \$257,552 from October, 1988 through September, 1993.

3. "Dynamic Response of Fuel Nozzle for Liquid-Fueled Gas Turbine Combustors", NASA Lewis and Parker Hannifin for \$54,183 from January, 1996 through December, 1996.

4. "Thermal Analysis for Melting and Freezing of Material in a Metallic Canister" NASA Lewis Research Center, for \$54,300 from November 1995 through November 1997.

5. "Comparative Study of Gas VS Electric Heaters in Thermoforming Applications", for \$347,724, from September 1997 through December 1998 [Gas Research Institute for \$292,724, CAMP Inc., for \$50,000, East Ohio Gas, for \$5,000].

6. "Development of a High Turndown Gas-Fired Infrared Burner for Thermoforming Applications", for \$350,000, from October 1999 through September 2000 [Gas Research Institute for \$230,000, CAMP Inc., for \$100,000, CNG, for \$20,000].

7. "Development of A Multi-Dimensional Stirling Engine Code for Thermodynamics Performance" NASA Glenn RC for \$192,608 from August 2000 through June 2002.

8. "Improving Performance of the Stirling Converter: Redesign of the Regenerator with Experiments, Computation and Modern Fabrication Techniques" U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy; for \$540,966 from September 2000 through August 2003. This research is collaboration among CSU, University of Minnesota, Gedeon Associate and NASA Glenn Research Center.

V. THESIS SUPERVISION Supervised over 40 Master/Doctoral students.

VI. PROFESSIONAL DEVELOPMENT (Selected)

Associate Fellow AIAA; Deputy Director, PreCollege Outreach, Region III, AIAA (1993-96); Treasurer (1994-95) and Secretary (1995-96), Cleveland Technical Society Council.

VII. RESEARCH PROFILE AND PUBLICATIONS (Selected Articles)

Ibrahim, M.B. "Effect of Streamline Curvature on Turbulent Convective Heat Transfer" NATIONAL HEAT TRANSFER CONFERENCE, PAPER NO. 87-HT-12, Pittsburgh, PA, 1987.

Ibrahim, M.B. "A Turbulence Model for the Heat Transfer Near Stagnation Point of a Circular Cylinder" APPLIED SCIENTIFIC RESEARCH, Vol 44, pp 287-302, 1987.

Sullivan, T.J. and Ibrahim, M.B. "Simulating Transitional Flow and Heat Transfer Over the Flat Plate and Circular Cylinder Using a K-Epsilon Turbulence Model" Heat Transfer in Gas Turbines, HTD-Vol. 120, pp 43-50, ASME WAM, San Francisco, CA, December 1989.

Ibrahim, M.B. and Buyco, E.H. "Laminar Momentum and Heat Transfer in Isosceles Triangular Ducts with Variable Thermophysical Properties" International Journal of Turbo & Jet-Engines, Vol. 10, No. 3, pp. 205-223, 1993.

Kerslake, T.W. and Ibrahim, M.B. "Analysis of Thermal Energy Storage Material with Change-of-Phase Volumetric Effects" Transaction of the ASME Journal of Solar Energy Engineering, Vol 115/1, pp 22-31, 1993.

Kerslake, T.W. and Ibrahim, M.B. "Two-Dimensional Model of a Space Station Freedom Thermal Energy Storage Canister" Transaction of the ASME Journal of Solar Energy Engineering, Vol 116/2, pp 114-121, 1994.

Ibrahim, M.B. and Kovach, R. "A Kalina Cycle Application for Power Generation" The International Journal of Energy, Vol 18, No. 9, pp. 961-969, 1993.

Ahn, K.H. and Ibrahim, M.B. "A 2-D Oscillating Flow Analysis in Stirling Engine Heat Exchangers" International Journal of Heat and Fluid Flow, Vol. 13, No. 4, pp 340-346, 1992.

Ibrahim, M.B. and Hashim, W. "Oscillating Flow in Channels with Sudden Change in Cross Section" Computers and Fluids, An International Journal, Vol 23, No. 1, pp 211-224, 1993.

Barankiewicz, W.S., Perusek, G.P. and Ibrahim, M.B. "Use of an Approximate Similarity Principle for the Thermal Scaling of a Full-Scale Thrust Augmenting Ejector" AIAA Journal of Propulsion and Power, Vol 10, No. 2, pp 198-203, 1994.

Ibrahim, M.B., Hashim, W., Tew, R.C. and Dudenhofer, J.E. "Heat Transfer in Oscillating Flows with Sudden Change in Cross Section" Proceedings of the 27th Intersociety Energy Conversion Engineering Conference, Society of Automotive Engineers Inc., Vol. 5, pp 5.503-5.508, San Diego, CA, August 4-7, 1992.

Iek, C., Boldman, D. and Ibrahim, M.B. "A 3-D Viscous Flow CFD Analysis of the Propeller Effect on an Advanced Ducted Propeller Subsonic Inlet" 29th AIAA/SAE/ASME/ASEE Joint Propulsion Conference and Exhibit, Monterey, CA, June 28-July 1, 1993. AIAA Journal of Propulsion and Power, Vol 11, No. 2, pp 236-243, 1995.

Ibrahim, M.B., Bauer, C., Simon, T. and Qiu, S. "Modeling of Oscillatory Laminar, Transitional And Turbulent Channel Flows and Heat Transfer" 10th International Heat Transfer Conference, Vol 4, pp 247-252, Brighton, England, August 14-18, 1994.

Ibrahim, M.B. and Kannapareddy, M. "Computational Heat Transfer Analysis for Oscillatory Channel Flows" First ISHMT-ASME Heat and Mass Transfer Conference, Bombay, India, January 5-7, 1994.

Ibrahim, T. Kerslake, P. Sokolov and C. Tolbert. " Experimental and Computational Thermal Energy Storage Canisters Proceeding of the International Congress on Fluid Dynamics & Propulsion, Cairo, Egypt, December 29-31, 1996. Transaction of the ASME Journal of Solar Energy Engineering, in print.

Sokolov , P., Ibrahim, M.B., and Kerslake,T. "Computational Fluid Mechanics and Heat Transfer Modeling of Thermal Energy Storage Canisters for Space Applications" 36th AIAA Aerospace Sciences, January 12-15, 1998. Journal of Spacecraft and Rockets, Vol. 37, No. 2, March-April 2000.

M. B. Ibrahim, T. Sanders, D. Yorwood, E. Steinthorsson, and M Benjamin" Spray Characteristics of an Airblast-Simplex Nozzle Liquid-fueled Gas Turbine Combustors" The 43rd ASME International Gas Turbine and Aeroengine Congress and Exposition, Stockholm, Sweden, June 1998. Journal of Atomization and Sprays, in print.

- Thermal Energy Storage Systems:
3-D Modeling of Transient Heat Transfer (Conduction, Convection & Radiation) in Thermal Energy Storage Canisters

III. EMPLOYMENT

3/98 – present Cleveland State University, Cleveland, Ohio, Chair, M.E. Department
 1/94 – present Cleveland State University, Cleveland, Ohio, Professor
 9/85 – 1/94 Cleveland State University, Cleveland, Ohio, Associate Professor
 8/84-9/85 Michigan Technological University, Houghton, Michigan, Assistant Professor
 8/83 – 8/84 Iowa State University, Ames, Iowa, Visiting Assistant Professor (On leave from UPM)
 10/78 – 8/83 University of Petroleum & Minerals, Dhahran, Saudi Arabia, Assistant Professor
 2/77 – 10/78 Bradford University, Bradford, United Kingdom, Post Doctoral Research Assistant
 1/74 – 2/77 Bradford University, Bradford, United Kingdom, Postgraduate Student
 9/73 – 12/73 Technical University of Denmark, Laboratory for Energetics, Visiting Research Fellow
 12/68 – 9/73 Cairo University, Cairo, Egypt, Demonstrator

IV. COMPLETED PROFESSIONAL DEVELOPMENT COURSES

1997 “ALGOR” Finite Element Software for Engineering Systems, Cleveland, Ohio, ALGOR, Inc.
 1995 “Combustor Modifications for Low Emissions” ASME Course, IGTI, Houston, Texas.
 1991 “PATRAN” and “FLOTRAN - Computationally Efficient Finite Element Software for Fluid Flow and Heat Transfer Problems”, NASA Lewis Research Center, Cleveland, Ohio.
 1990 “FIDAP” Fluid Dynamics International, Evanston, Illinois.
 1985 “Computational Fluid Flow and Heat Transfer” ASME Course, National Heat Transfer Conference, Denver, Colorado.
 1984 “Two-Phase Fluid Flow and Heat Transfer”, Iowa State University, Ames, Iowa.
 1978 “Theoretical and Experimental Analysis of Turbulent Fluid Flow and Heat Transfer” Imperial College - London, United Kingdom.
 1974 “Numerical Analysis and Computer Science”, Bradford University, Bradford, United Kingdom.
 1968- Completed Postgraduate Courses in Computer Programming (Fortran IV),
 1972 Thermodynamics, High Mathematics, and Combustion., Cairo University, Cairo, Egypt.

V. RESEARCH PROPOSALS AND GRANTS

V.I. RESEARCH ACTIVITIES WITH INDUSTRY

Dr. Ibrahim has been instrumental in conducting research activities with local and regional industry. The total amount of research funding is about \$800,000 over the past 8 years. Below is a brief description of each project title, funding source, funding amount and project duration:

- 1) Project Title: “Analysis of Using Gas/Electric Heaters in the Secondary Thermodynamics of Plastic Material”
Funding Source: CSU-AMC
Funding Amount: \$16,000
Project Duration: November 1993 – June 1996

- 2) Project Title: " Gas Heating Development in the Secondary Thermoforming of Plastic Material"
Funding Source: CAMP, Inc.
Funding Amount: \$25,000
Project Duration: July 1994 – June 1995
- 3) Project Title: "Comparative Study of Gas VS Electric Heaters in Thermoforming Applications"
Funding Source: Gas Research Institute, CAMP Inc., and East Ohio Gas
Funding Amount: \$347,724
Project Duration: September 1997 – December 1998
- 4) Project Title: " Investigation of Thermoforming Two Polypropylene Resins (α & β) Using Large and Small Molds"
Funding Source: Aristech Chemical Corp. Research Laboratory
Funding Amount: \$4,800
Project Duration: August 1998
- 5) Project Title: "Development of a High Turndown Gas-Fired Infrared Burner for Thermoforming Applications"
Funding Source: Gas Research Institute, CAMP Inc., and CNG
Funding Amount: \$350,000
Project Duration: October 1999 – September 2001
- 6) Project Title: " Investigation of the Thermal Cycle in the Production of Foam Patterns for Lost Foam Casting Process"
Funding Source: CAMP, Inc.
Funding Amount: \$29,500
Project Duration: July 1995 – June 1996
- 7) Project Title: " Corrosion Test"
Funding Source: IAS
Funding Amount: \$5,000
Project Duration: November 1995 – February 1996
- 8) Project Title: " Thermal Conductivity of Thin Plastic Sheets"
Funding Source: OSS
Funding Amount: \$3,400
Project Duration: November 1996 – February 1997
- 9) Project Title: "Infrared Consolidation Study No. 1"
Funding Source: Pentair Water Treatment
Funding Amount: \$9,500
Project Duration: July 2001 – August 2001
- 10) Project Title: "A Study of the Cooling System for SL192 Hatchers"
Funding Source: Chickmaster Incubator Co.
Funding Amount: \$3,900
Project Duration: August 2001 – November 2001

- 9) Project Title: "Improving Performance of the Stirling Converter: Redesign of the Regenerator with Experiments, Computation and Modern Fabrication Techniques"
Funding Source: U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy
Funding Amount: \$540,966
Project Duration: September 2000 through August 2003
 [This research is collaboration among CSU, University of Minnesota, and Gedeon Associates and NASA Glenn Research Center.]
- 10) Project Title: "Validation of Multi-Dimensional Stirling Engine Codes"
Funding Source: NASA Glenn Research Center
Funding Amount: \$100,000
Project Duration: March 2001 through August 2001
 [This research is collaboration among CSU, University of Minnesota, and Gedeon Associates.]
- 11) Project Title: "MEMS Stirling Cooler: Modeling and Analysis"
Funding Source: NASA Glenn Research Center
Funding Amount: \$18,020
Project Duration: March 2001 through August 2001
 [This research is collaboration between CSU and Gedeon Associates.]

V. THESIS SUPERVISION

DOCTORAL

1. "Optimum Load Matching in Direct-Coupling Photovoltaic Systems"
Kamel Y. Khouzam, Doctoral Dissertation, CSU, August 1989. (Member of the Doctoral Committee).
2. "Transient Thermal Analysis of A Brayton Cycle Solar Dynamic Heat Receiver"
Kyung Ahn, Doctoral Dissertation, CSU, August 1990. (Chairman of Doctoral Committee).
3. "Computational Heat Transfer Modeling of Thermal Energy Storage Canisters" Pavel Sokolov Doctoral Dissertation, CSU, August 1997. (Chairman of Doctoral Committee).
3. "Computational And Experimental Investigation of A Multi-Mode Heat Transfer In an Electric Infrared Oven" Tanios Bougebrayel Doctoral Dissertation, CSU, May 2000. (Chairman of Doctoral Committee).
5. "Computational Fluid Dynamics And Heat Transfer Modeling of Stirling Engine Type Cylinders" Roy Tew Doctoral Dissertation, CSU, November 2000. (Chairman of Doctoral Committee).
6. "Computational And Experimental Investigation of Premixed Combustion In Porous Ceramic Infrared Heaters " Yongwei Luan Doctoral Dissertation, CSU, In progress. (Chairman of Doctoral Committee).
7. Zhiguo Zhang, Doctoral Dissertation, CSU, In progress. (Chairman of the Doctoral Dissertation Committee).
8. Joseph Doraski, Doctoral Dissertation, CSU, In progress. (Chairman of the Doctoral Dissertation Committee).